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Abstract

This report documents the final site cleanup of the previously decommissioned 184-B Powerhouse, 184-D Powerhouse, and 1717-F Maintenance Shop. The report includes the three site cleanup projects because their like-work effort and contiguous FY 88 work schedule. The site projects started in January 1988 and were completed in April 1988.

The superstructures of each facility were previously demolished, leaving the foundation slabs, footings, tunnels, pits and other associated concrete structures at or near grade level for site cleanup.

The facilities concrete structures were exposed by excavating and demolishing to at least three feet below grade. The tasks were accomplished using conventional heavy equipment including a crane with a wrecking ball, earth-moving bulldozer, backhoe, front-end loader, and trucks for demolition, rubble removal/disposal and site backfill.

No Radiological Work Procedures (RWP) were required based on prior usage, operating history and project site surveys.





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# FACILITY DECOMMISSIONING REPORT

## 1.0 INTRODUCTION

This report documents the final site cleanup of the previously decommissioned 184-B Powerhouse, 184-D Powerhouse, and 1717-F Maintenance Shop. The report includes the three site cleanup projects because of their like-work effort and the contiguous FY 88 work schedule. The site cleanup projects were worked consecutively from the 184-B site, to the 184-D site and finally the 1717-F site. The site projects started in January 1988 and were completed in April of 1988. The superstructures of each facility were previously demolished, leaving the foundation slabs, footings, tunnels, pits and other associated concrete structures at or near grade level for site cleanup. Radiological controls were based on facility usage and operating history. These facilities were never radiologically controlled sites, nor were radioactive materials stored on the sites.



The scope of the final site cleanup work included:

- Planning and Engineering that included preparation of Decommissioning Work Procedures (DWP) and Job Safety Analysis (JSA). No Radiation Work Procedures (RWP) were required because project radiological surveys did not identify contaminated material prior to or during site cleanup. The completion of the procedures and Operations readiness checklist authorized site cleanup to proceed on January 25, 1988 for the 184-B site, February 5, 1988 for the 184-D site and February 26, 1988 for the 1717-F site
- Radiological and Hazardous Material surveys and sampling
- Site preparation
- Site cleanup
- Site restoration and grading
- Preparation of final cleanup reports.

The projects involved successfully cleaning up facility foundations and potential hazards left by the previous excessing demolition program. The final site cleanup projects accomplished the following:

- The 184-B Facility cleanup removed equipment mounts and conveyor supports; demolished and backfilled the coal conveyor tunnel and crusher house pit; demolished the salt dissolving pits and brine pumping station; demolished the 184-B Powerhouse foundation slabs;

demolished septic tank and two sewer manholes after transporting septic water to the 100-N septic pond for disposal; and graded the site to conform with surrounding terrain. The contents from the brine pit and the septic tank were analyzed for radionuclides and heavy metals (using the EP Toxicity Test) and were below levels of regulatory concern. The water from the brine pit was also analyzed for salinity and contained less than 1% NaCl, therefore it was allowed to seep into the ground as the pit was demolished.

- The 184-D Facility cleanup removed equipment mounts and conveyor supports; demolished and backfilled the coal conveyor tunnel and crusher house pit; demolished salt dissolving pits and brine pumping station; demolished the 184-D Powerhouse foundation slabs and three stack foundation footings; and graded the site to conform with surrounding terrain. The water from the 184-D salt dissolving and brine pits was greater than 10% NaCl (Hazardous Material limit, WAC 173-303) and was sent offsite for disposal by a regulated shipper.

- The 1717-F Facility cleanup demolished the maintenance shop slab and foundation footings; demolished the shop gas cylinder storage shed; removed power poles and surrounding wire fence; and graded the site to conform with surrounding terrain.

Work on the projects was performed by WHC Surplus Facilities (SF) Operations forces and outer facilities maintenance crafts under the supervision of SF Operations. The 184-B and -D work was prefaced by removing approximately 300 ft of abandoned railroad track prior to working on the adjacent coal pits and salt dissolving pits.

# 2.0 DESCRIPTION OF FACILITY

## 2.1 HISTORY

The 100-B, -D, and -F Facilities were constructed in 1943 as part of the original Hanford Site construction. The 184-B and -D Powerhouse intended use was to provide steam and emergency power in support of the respective Production Reactor. The 1717-F Facility provided maintenance shops for carpenters, millwrights, welders, and painters for area support. The reactors operated with their ancillary facilities until the 105-C Reactor was shut down in the 100-B Area in 1969, the 105-D Reactor shut down in 1967 and the 105-F Reactor shut down in 1965. The ancillary facilities were gradually phased out and operating capabilities transferred to other facilities.

The demolition of the 184-B Powerhouse 300 ft stacks was performed by UNC Decommissioning in FY 1983 (Reference 1) concurrent with salvage and demolition subcontract administered by RHO Excess Surplus Sales group for the other 184-B Powerhouse structures demolition. The demolition of the 184-D Powerhouse Facility was through public sale to Adams Dismantling Co. in 1979 for $74 K. The contract did not include removal of the heavy foundation base which supported the boilers and three stacks demolished in 1978. The 1717-F Maintenance Shop was demolished by the onsite construction contractor in 1983. The follow-on post demolition site cleanup has been performed with a varying level of activity under the Maintenance and Surveillance Program depending on the hazard status associated with the sites and on the availability of funds. Final site cleanup work accomplished the disposal of remaining hazardous waste, demolition and rubble removal to a minimum of 3 ft below grade on all remaining site structures during FY 1988.

## 2.2 LOCATIONS

The 184-B Powerhouse was located in the 100-B Area, the 184-D Powerhouse in the 100-D Area, and the 1717-F Maintenance Shop in the 100-F Area. These areas are all located within the Hanford Site (Figures 1 and 2) on the south bank of the Columbia River approximately 35 river miles upstream and 32 road miles from the City of Richland, in the southeastern corner of Washington State. The site boundaries of the 100 Areas, and the locations of the 184-B Powerhouse (Figure 3), 184-D Powerhouse (Figure 4) and 1717-F Maintenance Shop (Figure 5) were arranged within a similar plot plan for each of their

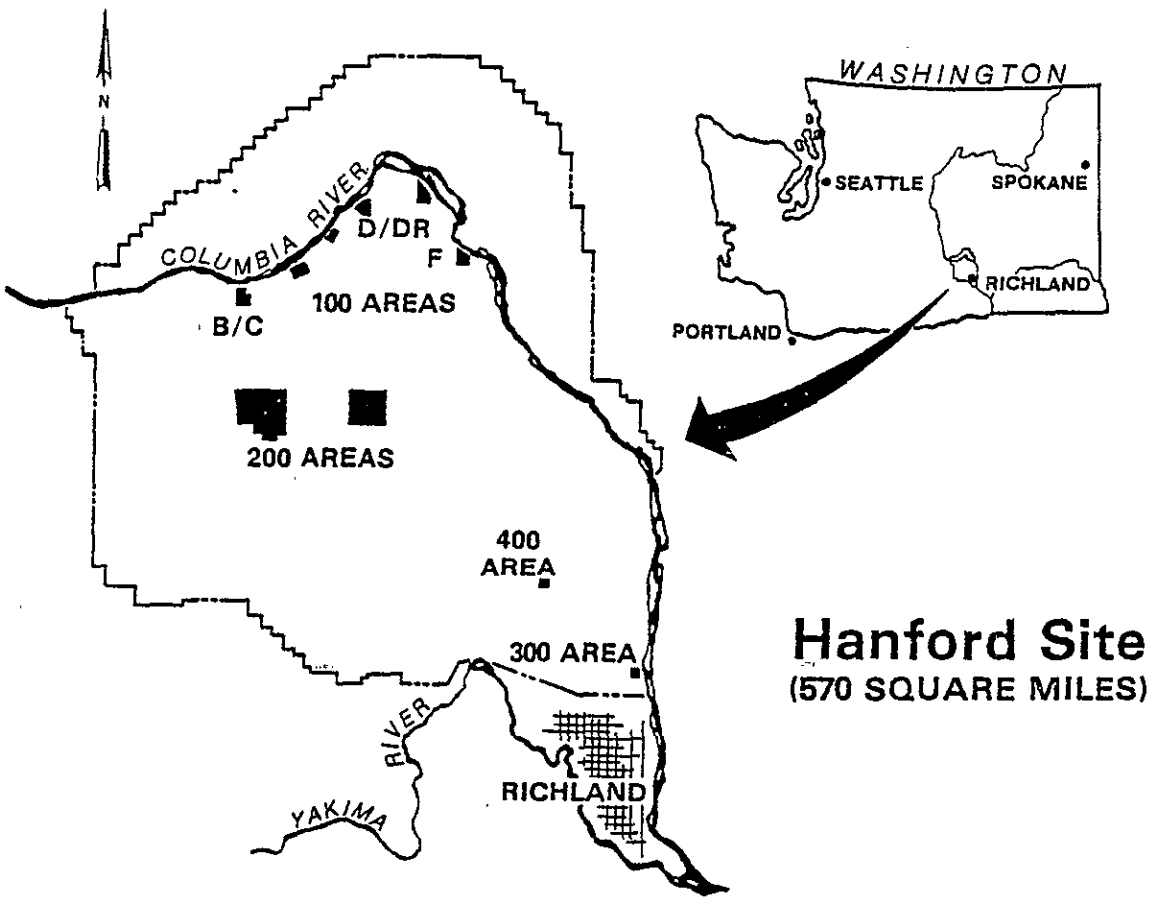


Figure 1. Location of Hanford Site.

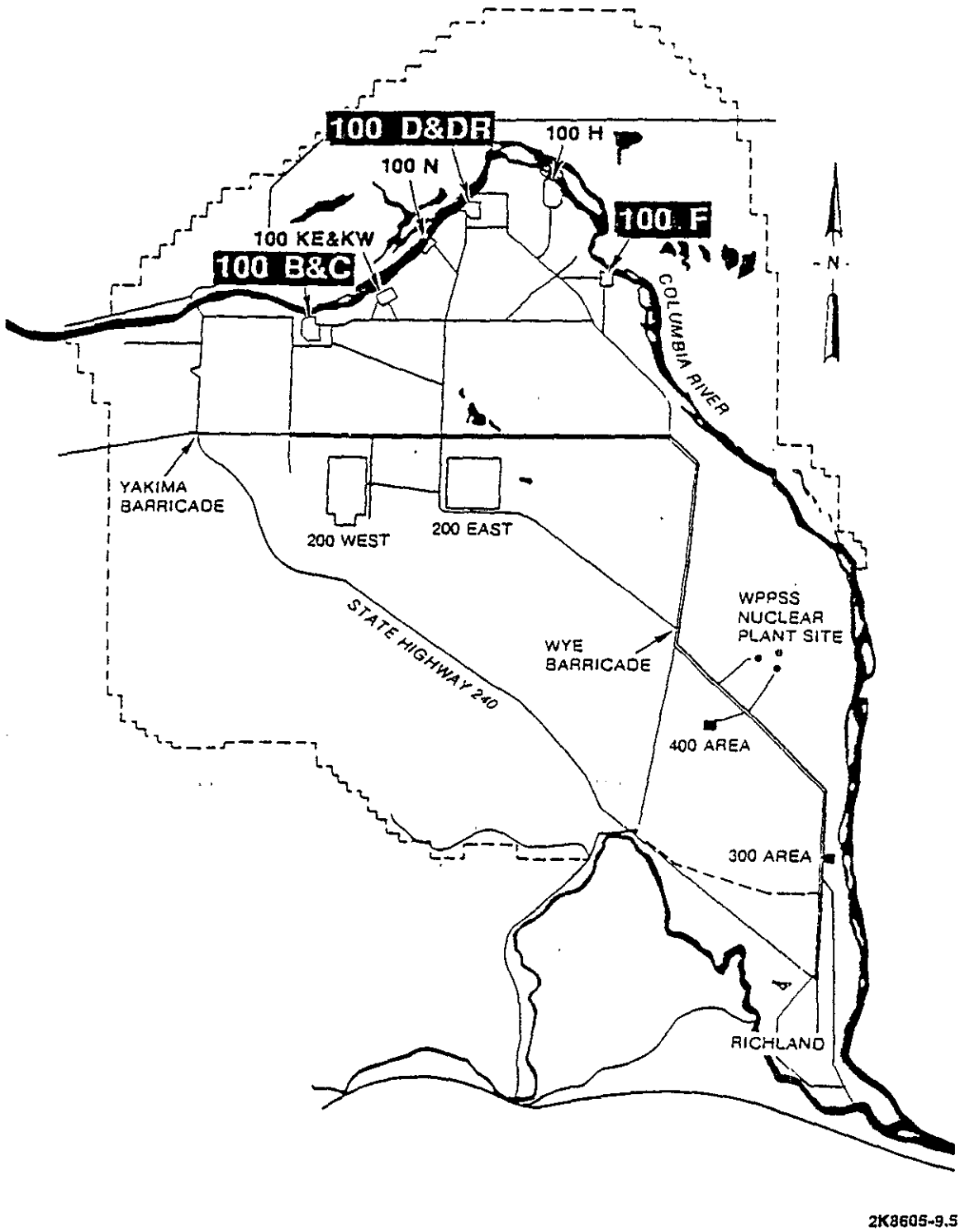


Figure 2. Hanford 100 Area Site Map.

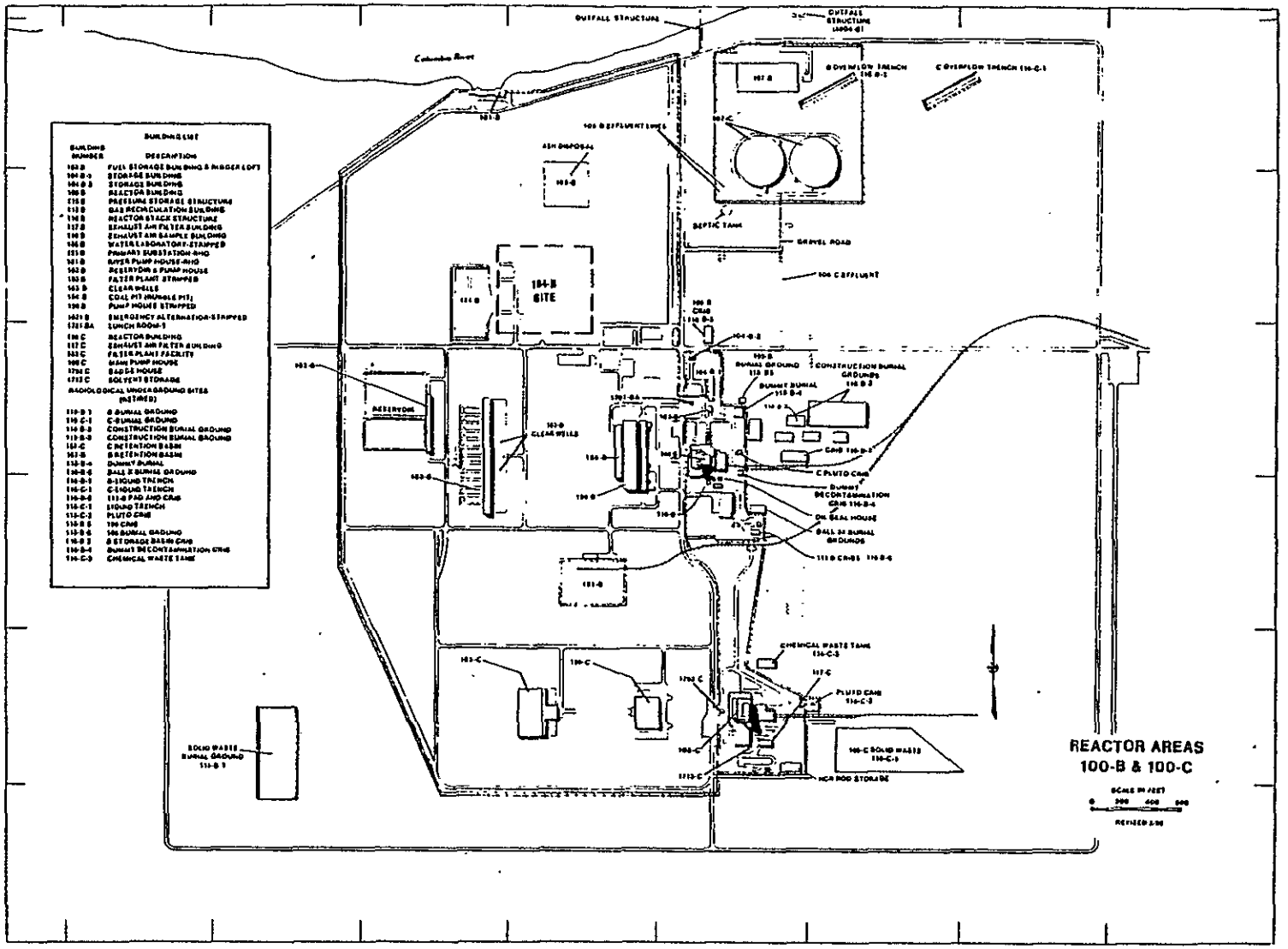


Figure 3. Location of the 184-B Powerhouse Site in the 100-B/C Area.

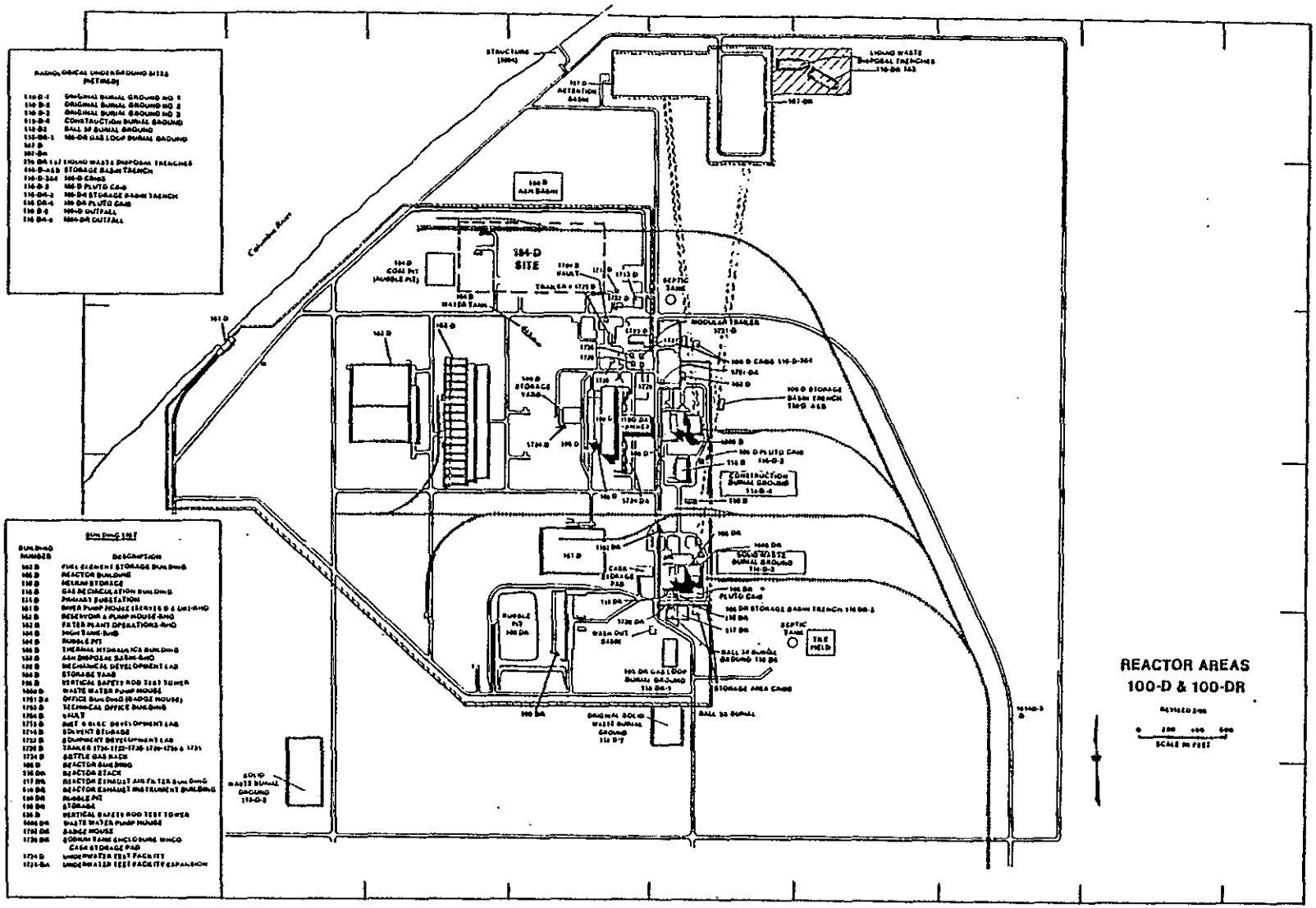


Figure 4. Location of the 184-D Powerhouse Site in the 100-D/DR Area.

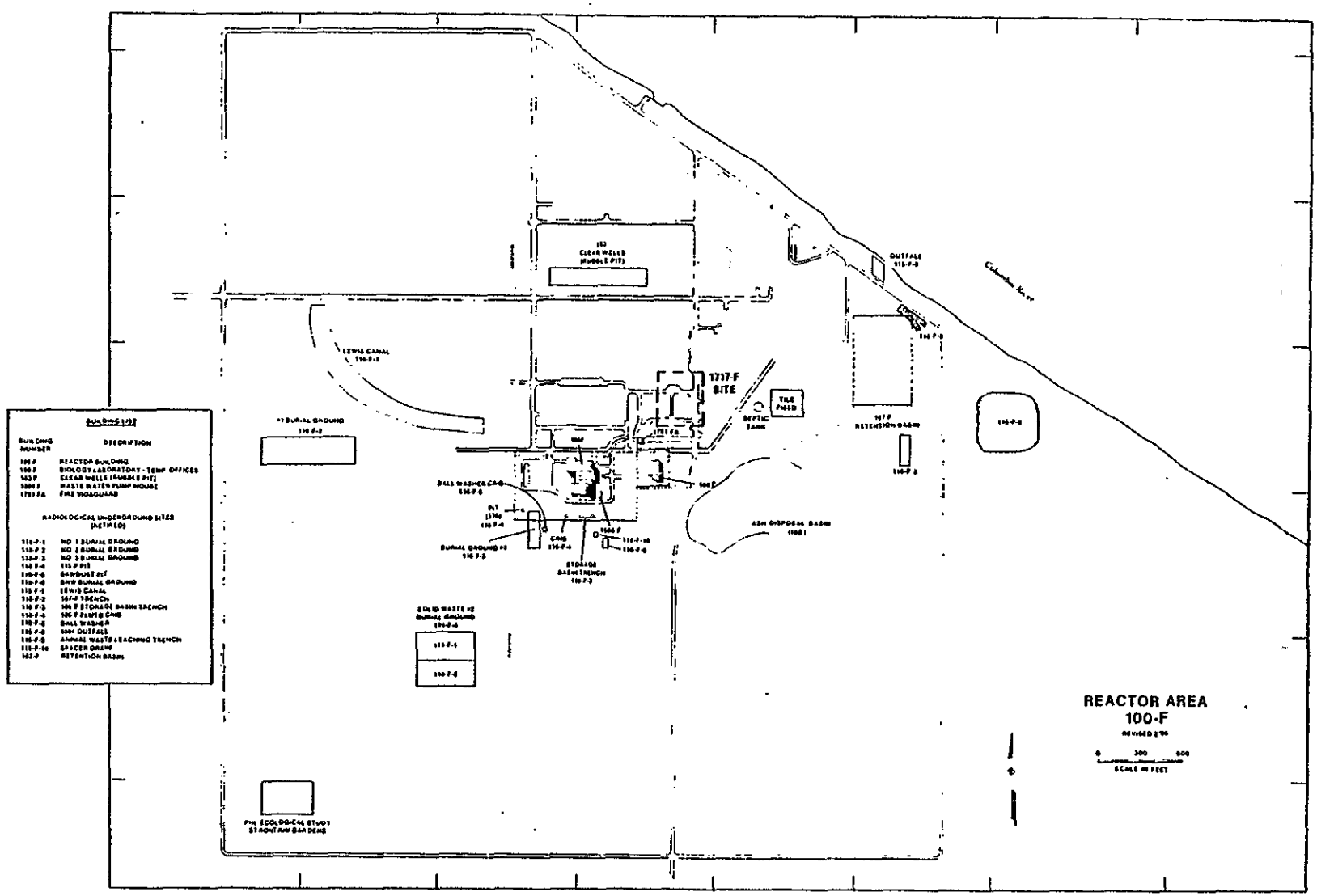


Figure 5. Location of the 1717-F Maintenance Shop Site in the 100-F Area.

respective sites. The Hanford Site coordinates* at the southwest corner of the 184-B Powerhouse are W54023.20, N93100.5 and may be found on drawing number M-1901-D, Sheet 5. The Hanford Site coordinates* at the northwest corner of the 184-D Powerhouse are W81850.75, N70048.21 and may be found on drawing number W-70822. The Hanford Site coordinates* at the southeast corner of the 1717-F Maintenance Shop are W30160, N79499.0 and may be found on drawing number H-1-14556.

## 2.3 PHYSICAL DESCRIPTION

The 184 Powerhouse Buildings were of steel frame and concrete block construction. The roofs were of precast concrete with built-up gravel surface. The 184-B Facility contained four coal fired boilers and the 184-D Facility had five boilers, each boiler had a 290 ton capacity coal banker which was fed by gravity into a stoker-feeder hopper serving five steam turbine stokers. Draft for each boiler was provided by 45,000 $ft^3$/min turbine driven blowers.

Furnace gas discharge was through two 300 ft stacks located adjacent to the 184-B Building and three 300 ft stacks at 184-D. The stacks were of reinforced concrete construction, round, with a base diameter of 22 ft-5 in. Maximum wall thickness of concrete was 1-1/2 ft at the stack base. Each stack rested on a double octagonal shaped base which extended 10 ft-3 in. below grade. The upper octagon measured 25 ft across the flats and was 3 ft-3 in. thick. The lower octagon was 34 ft across the flats and 7 ft thick.

The previous excessing demolition program left the powerhouse foundation slabs, footings and several associated concrete structures intact. The foundation slabs were exposed, with concrete equipment mounts rising 1 to 3 ft above the main slabs. The 184-D three massive stack bases were left intact. The general area was littered with demolition rubble.

The salt dissolving pits and brine pumping stations were located adjacent to the railroad tracks north of the powerhouse slab. A small wood structure was left standing at the 184-B brine pump pit. The two dissolving pits at each site were below grade concrete vaults with an internal void space of about 900 $ft^3$ each. The brine pump pit was also below grade and comprised of 500 $ft^3$ of void space. The 184-B pits were partially backfilled with rubble and only the brine pump pit contained water (about 500 gal). The 184-D brine pits contained water (about 4,100 gal) and salt cake (about 8.3 $yd^3$).



*The Hanford site coordinates can be converted to United States Geodetic Survey (USGS)/(Washington State/Lambert) coordinates with the following:

$N_L$ = 405,302.04 - $W^H$ SIN + $N_H$ COS
$E_L$ = 2,295,325,01 - $W_H$ COS - $N_H$ SIN
$N_H$ = Northing on Hanford Plant Grid
$W_H$ = Westing on Hanford Plant Grid
$N_L$ = Northing on Washington State Grid
$E_L$ = Easting on Washington State Grid.

The accuracy using the above equations is not presently defined. The accuracy of the equations shall be determined prior to use in the field.

The powerhouse coal was unloaded from rail cars into two below grade hoppers located beneath the railroad tracks. The coal was then conveyed through a 155 ft long concrete tunnel before it resurfaced. The coal hoppers and tunnel at 184-B as well as the crusher house pit at 184-D were filled with dirt within the structure's concrete walls extending to grade level. The 184-D tunnel roof was left intact and tunnel partially backfilled with rubble.

The 1717-F Maintenance Shop was a single-story wooden frame structure with transite (cemented asbestos) siding, concrete foundation and floor slab, and flat wooden roof with built-up tar and gravel surface. The building housed office space and craft shops in an area of approximately 12,500 $ft^2$. The building had a low capacity hoist on a curved monorail. An auxiliary boiler system was added in 1964 for heating the adjacent laboratory facilities. The two 25,000 pounds per hour oil-fired boilers were placed at the northwest corner of the shop facility and the three 25,000 gal oil tanks were buried adjacent to the boiler room on the west side of the building.

The previous Site Construction Forces demolition operation left the shop foundation slabs and footings, a small concrete-block shed with transite roof for gas bottle storage, three abandoned and stripped power poles, and a small protection wire fence. The asphalt pavement surrounding the entire shop foundation has some cracking damage next to slab area from past and present operations.

Figure 6 (184-B site), Figure 7 (184-D site), and Figure 8 (1717-F site) shows the status of the facilities area before and after final site cleanup.

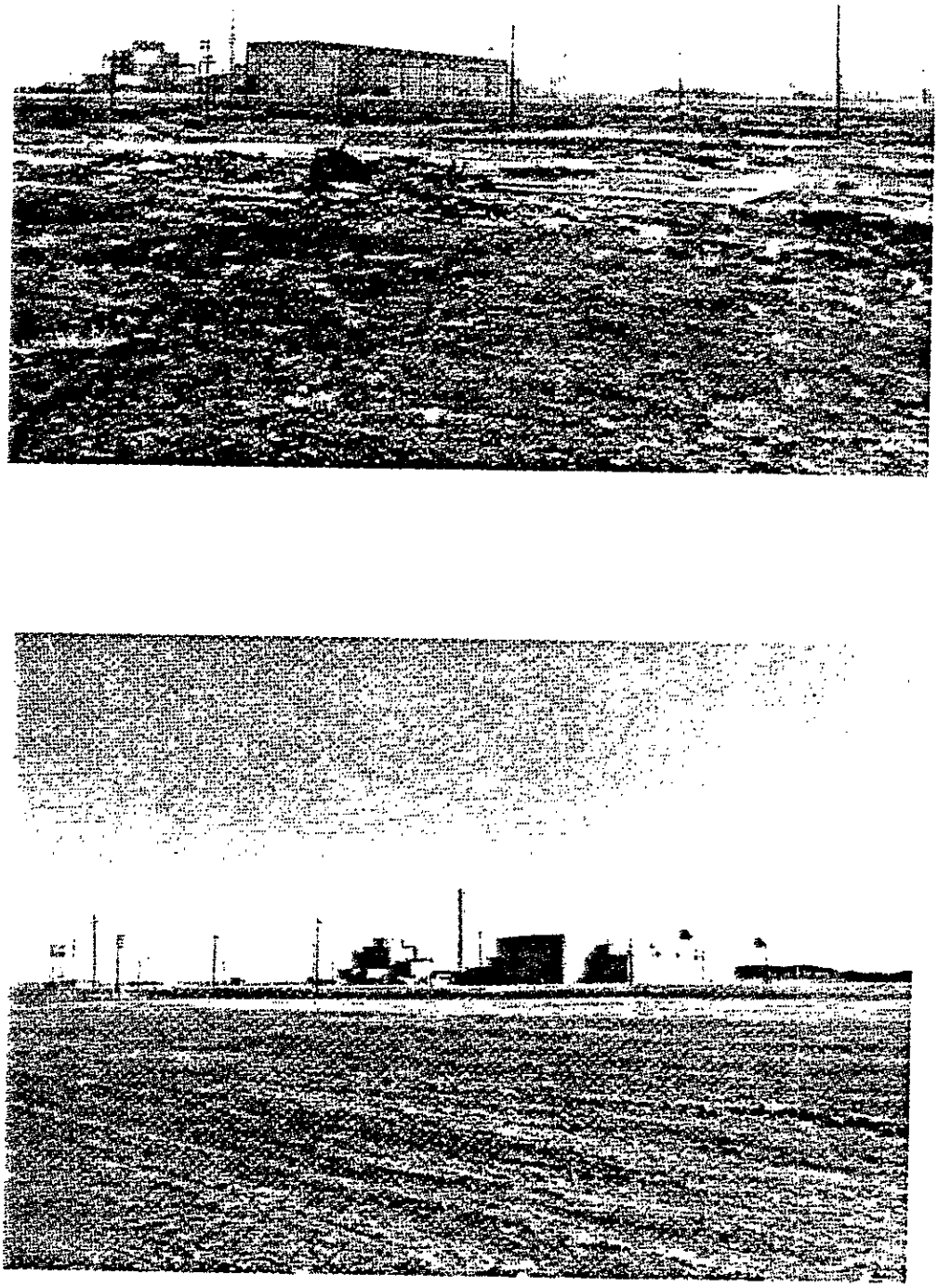

Figure 6. Before (Top) and After (Bottom) Final Site Cleanup on the 184-B Powerhouse Site.

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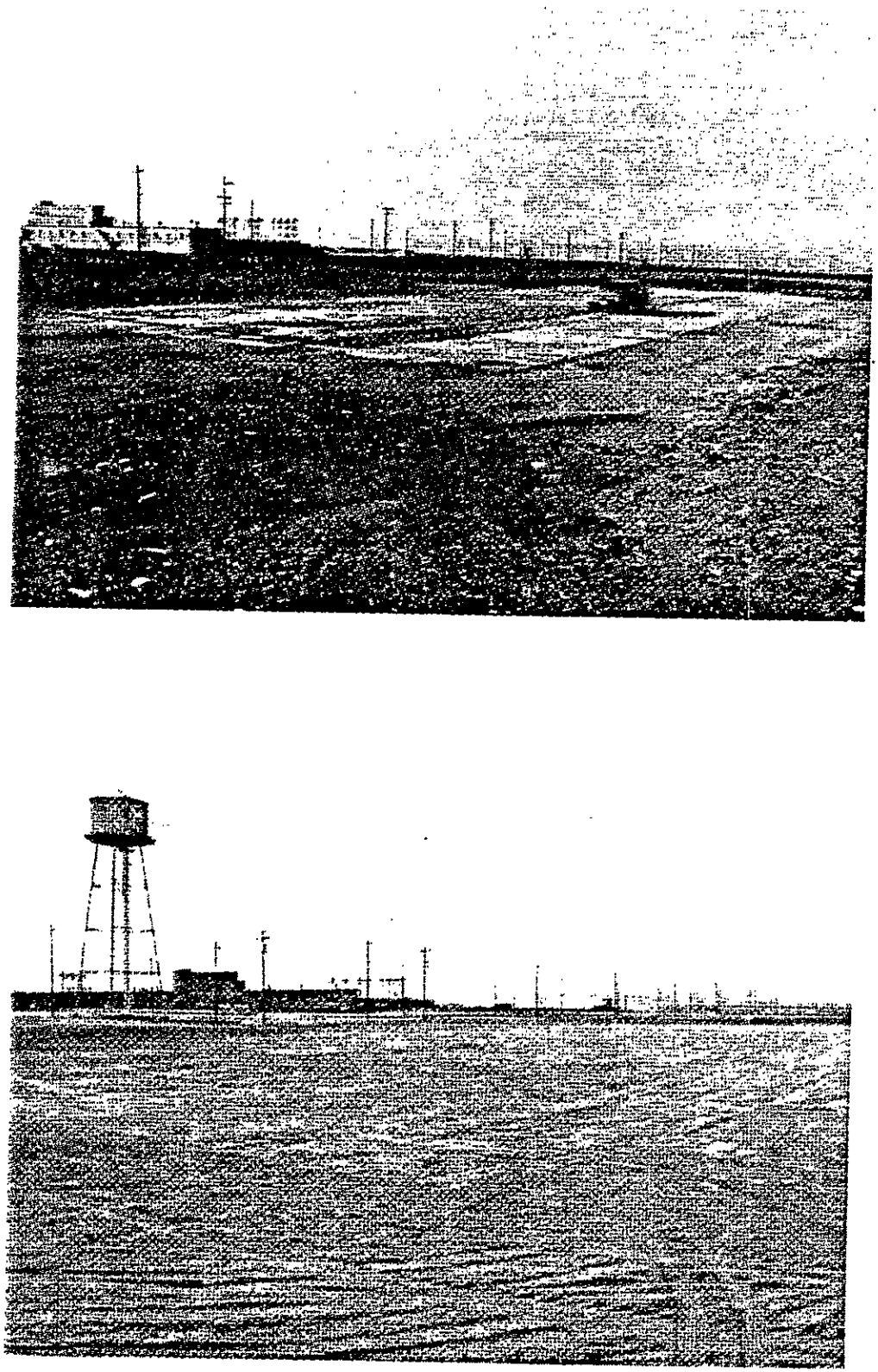

Figure 7. Before (Top) and After (Bottom) Final Site Cleanup on the 184-D Powerhouse Site.

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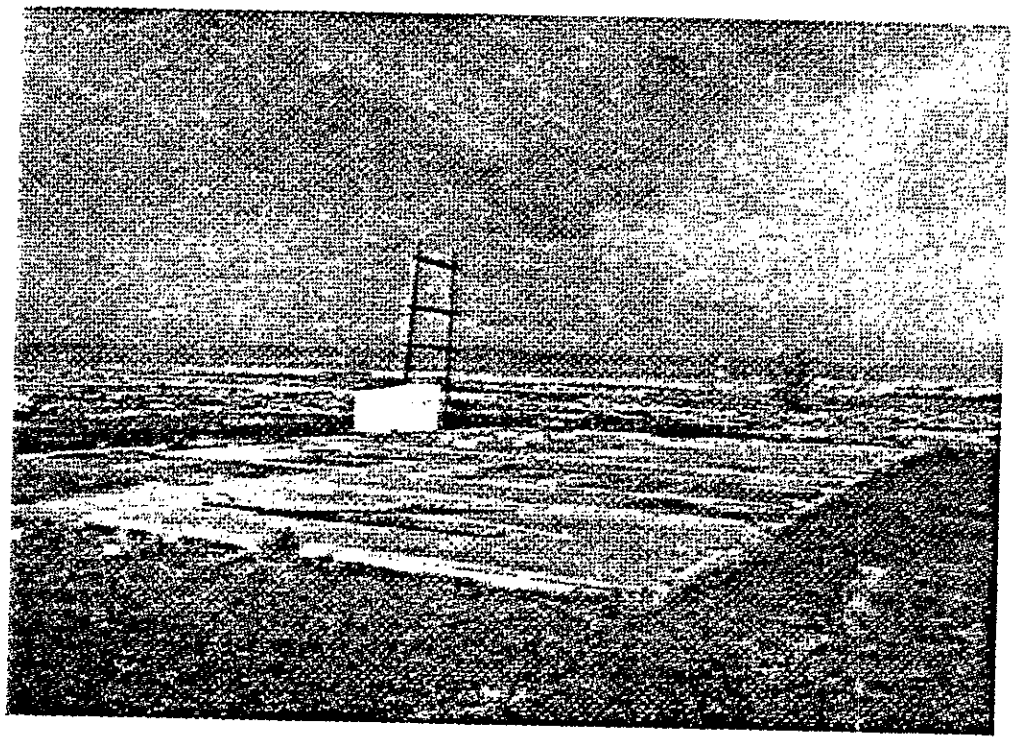

Figure 8. Before (Top) and After (Bottom) Final Site Cleanup on the 1717-F Maintenance Shop Site.

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## 3.0 ADMINISTRATIVE CONTROLS

Project Management was delineated in the Decommissioning Services Management Guide, UNI-3073 (Reference 2). The guide describes the decommissioning organization, responsibilities, relevant documents, and other related aspects to decommission the 100 Area shut-down facilities in a safe cost-effective manner.

A detailed Work Breakdown Structure (WBS) and Task/Work Package were developed for the final site cleanup so that all incurred project costs could be monitored and controlled. The requirements of UNC's Cost/Schedule Control System as outlined in UNI-M-109 Rev 1 (Reference 3) and the requirements of Rockwell's Management Control System as outlined in RHO-GM-MA-2 (Reference 4) were implemented. These systems aided in monitoring the projects.

The Project Readiness Review is a systematic approach in the review, verification, and documentation of facility and related equipment, procedure and managerial controls and personnel training aspects of a project prior to the commencement of any physical work. Based on the tasks identified in the project work scope, comparison to previously performed tasks, the level of National Environmental Policy Act (NEPA) documentation required, and the level of hazard identified during the safety analysis, a level of readiness review is selected and approved by Decommissioning Management. For the subject sites, Decommissioning Engineering and Operations determined the final site cleanup tasks are comparable to past site cleanup projects and that project readiness objectives would be fulfilled when the site specific Decommissioning Work Procedures (DWP), Job Safety Analysis (JSA) and Operations Readiness Checklists were approved and issued.

The final site cleanup progress and costs were tracked and reported/ monitored through weekly highlights, monthly status reports, monthly schedule statusing and Financial Data System (FDS). Weekly scheduled meetings were held as required to discuss problem areas, progress, and assign action item responsibilities.

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# 4.0 MATERIAL CHARACTERIZATION

## 4.1 HAZARDOUS MATERIALS

The subject sites were thoroughly surveyed for both radiological and nonradiological hazardous materials as the first step in the decommissioning process. The water in the 184-B brine water pump pit (approximately 500 gal), 184-B septic tank (approximately 4,900 gal) and 184-D salt dissolving pits (approximately 4,100 gal) were sampled for analysis. The 184-B brine water pump pit water analysis results found no significant radioactivity above background, NaCl concentration less than 1%, and HEHF Laboratory detected no reportable concentrations of heavy metals (EP Toxicity Test). The 184-B septic tank water analysis results found no significant radioactivity above background and HEHF Laboratory detected no reportable concentrations of heavy metals. The 184-D salt dissolving pits water analysis results found no significant radioactivity above background, HEHF Laboratory detected no reportable concentration of heavy metals, however, the NaCl concentrations were greater than 10% (Hazardous Material limit). The 184-D salt dissolving pits also contained approximately 8.3 $yd^3$ of salt (NaCl) cake.

The in-progress site cleanup excavation found friable asbestos insulation debris placed in a concrete valve box (460 $ft^3$) in the 184-B Powerhouse floor slab and covering a 1-1/2 in. diameter heater pipe (approximately 10 $ft^3$) in the 184-D Coal Tunnel. A 4-in. diameter cemented asbestos pipe was also found under the 184-D Powerhouse floor slab and transite siding fragments were found at the 184-D Coal Facility and 1717-F site (approximately 768 $ft^3$). This asbestos waste was removed for proper disposal at the 200 Area Central Landfill. Some fragments of transite siding were irretrievable from the 184-D Coal Tunnel and were left mixed with the demolition debris.

## 4.2 RADIOLOGICAL

Radiological controls were based on the usage and operating history of the facilities. These facilities were never radiologically controlled sites, nor were radioactive materials stored on the sites. No Radiation Work Procedures (RWP) were required because project radiological surveys did not identify contaminated material prior to or during site cleanup activities.

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# 5.0 DECOMMISSIONING WORK SEQUENCE

## 5.1 SITE PREPARATION

The following site preparations were completed before any final site cleanup work began. All preparations complied with the approved Decommissioning Work Procedure (DWP) and Job Safety Analysis (JSA).

- Decommissioning Engineering and Decommissioning Operations inspection determined there were no energized power sources or active underground utilities in the area. They also provided an excavation permit.

- The abandoned railroad track adjacent to the coal pits and salt dissolving pits at the Powerhouse sites had track sections removed prior to demolition.

- Initial site surveys by Radiation and Operational Health Physics found no significant radioactivity above background. The surveys substantiated a Radiation Work Procedure (RWP) would not be required to initiate site cleanup. Follow-on surveys verified no RWPs were needed during site cleanup.

- Decommissioning Health Physics obtained samples from the pits and tanks containing water and performed analyses which verified that no significant radiological readings above background were present. Health Physics also, obtained hazardous waste analysis for heavy metals and NaCl concentration on the samples prior to starting site cleanup.



## 5.2 SITE CLEANUP ACTIVITIES

Work began the fourth week of January 1988 for the 184-B site, second week of February 1988 for the 184-D site, and fourth week of March for the 1717-F site after the site specific Decommissioning Work Procedures including Job Safety Analysis and Operations Readiness Checklist were approved and issued.

An access control point was established and posted at the cleanup sites for each of the Areas. All equipment, vehicles and personnel entered and exited through the control point. Radiological surveys were performed by Operational Health Physics, including the initial site survey and periodic in-progress work surveys which verified that no radiological controls were warranted. No special protective clothing or equipment was required.

Equipment mobilization and preparation work was fairly repetitive for the three site cleanup efforts. The water from the brine pits and septic tank was all sampled and analyzed at the same time in January 1988. The railroad tracks were removed consecutively. The Railroad Maintenance and Decommissioning Operations started removing track at 184-B the last week of January and completed the 184-D track removal the second week of February 1988. The water

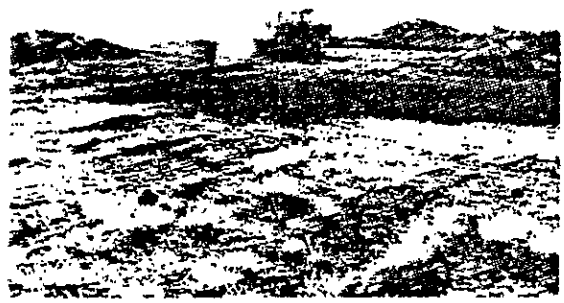
and salt cake (NaCl concentration greater than 10%) was removed from the 184-D brine pits and disposed of as hazardous waste by an offsite subcontractor, Northwest Enviro Services Inc., during the first week of March 1988 prior to demolition and backfill.

Concrete structures at all sites were exposed by excavating and demolished to at least 3 ft below grade (Figures 9, 10, and 11). The demolition, rubble removal/disposal and site backfill tasks were accomplished using conventional heavy equipment including a crane with a wrecking ball, earth moving bulldozer, backhoe, front-end loader, and trucks. Dust control was maintained with water spray before and during demolition activities. As excavation uncovered friable asbestos insulation (184-B Powerhouse Valve Pit Box and 184-D Coal Tunnel heater pipe) and nonfriable cemented asbestos (transite) siding fragments, (mainly in 184-D Coal Handling Facility and 1717-F Building slab area) the material was handled, packaged and transported for disposal in the Hanford central landfill in compliance with the regulations and requirements described in UNI-M-38, Industrial Safety Manual (Reference 5) and UNI-M-29, Shipment of Radioactive and Other Hazardous Material (Reference 6). The 184-D Coal Facility has transite (non-friable asbestos) mixed with other inert demolition debris from a previous program. Transite buried deeper than 3 ft was left in situ by covering with clean backfill as concurred with by 100 Areas Environmental Protection on March 18, 1988 in compliance with requirements of UNI-M-31, Environmental Control Manual (Reference 7).

Prior to backfilling over the demolished in situ rubble and components, holes were punched in the tunnels, pits, and tank bottoms for drainage. The concrete rubble left in situ was worked into position to reduce voids and minimize future subsidence. The material was also compacted to increase the distance below grade to assure room for at least 3 ft of clean backfill. Heavy equipment was driven over the backfill to insure compaction. The in situ rubble was buried at least 3 ft deep for all site facilities.

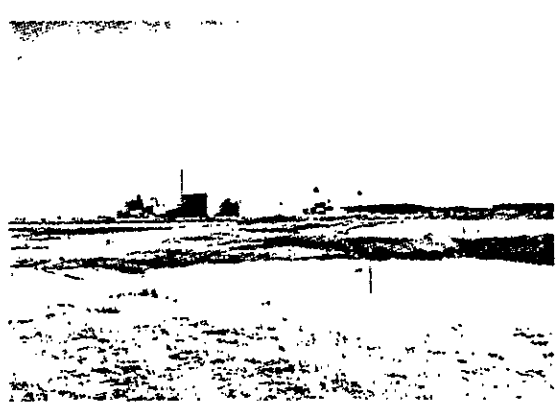
No radioactive materials were found within the site structures.

1. Excavating and demolition of slab, foundation and footing.



2. Preparing to remove rubble for on-site landfill disposal.

3. Removing rubble from razed structures and placement of backfill from on-site gravel pit.



4. Site area was filled with clean earth to grade level.

Figure 9. Final Site Cleanup of a Typical Building Slab (184-B Powerhouse).

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1. Powerhouse coal handling facility before site cleanup.

2. Excavation for demolition of tunnel walls and roof.

3. Rubble from razed tunnel roof and walls resting on debris from previous demolition program.

4. Coal handling facility area after backfill with clean earth to grade level.

Figure 10. Final Site Cleanup of a Typical Coal Facility (184-D Site).

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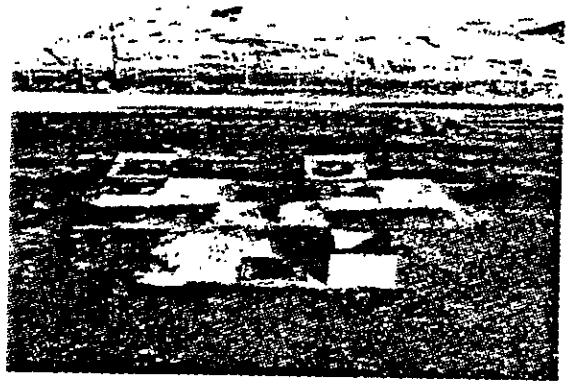
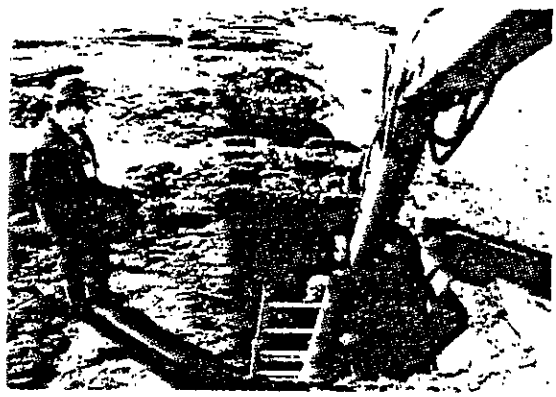
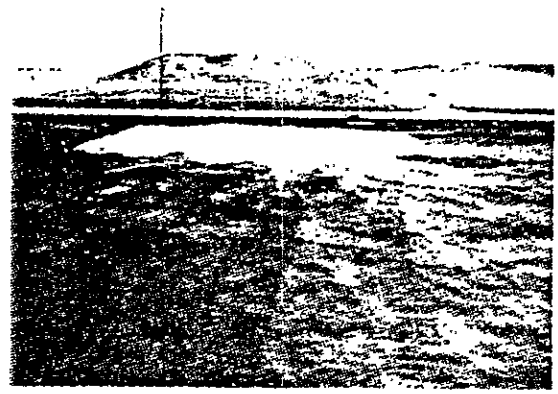


1. Brine water facility before site cleanup.

2. Brine pit water removed leaving salt cake on bottom.



3. Removal of salt cake from bottom of brine dissolving pit(s).



4. Brine water facility area demolition and backfill with clean earth to grade level.

Figure 11. Final Site Cleanup of a Typical Brine Water Facility (184-D Site).

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# 6.0 PROJECT BUDGET AND SCHEDULE

## 6.1 PROJECT COSTS

The estimated cost and budget baseline amount for the final site cleanup of the 184-B Powerhouse, 184-D Powerhouse, and 1717-F Maintenance Shop was $128,200. Initially, work progressed very well with indications that hazardous waste disposal costs would be absorbed by the Hanford Waste Management contract and would not be charged back to the project, which would result in a budget underrun. The budget was revised in April 1988 as part of the Hanford Facilities Decommissioning Programs FY 1988 mid-year budget review. The budget rebaseline effort is documented on Change Request No. U88-017, dated April 22, 1988. The rebaselined final site cleanup budget was adjusted to $119,300. Actual costs were $128,700. The $9,400 (7.9%) cost overrun was primarily due to the costs for disposing of the brine water and salt cake via offsite hazardous waste disposal contractor services being charged back to the project. Table 1 summarizes the final site cleanup costs.

## 6.2 PROJECT SCHEDULE

Final site cleanup activities were authorized to proceed when the site specific Decommissioning Work Procedures and Operations Readiness Checklists were approved and issued on January 19, 1988 for the 184-B site, February 3, 1988 for the 184-D site, and February 26, 1988 for the 1717-F site. Site preparation including surveys, sampling, track removal (184-B and -D), and mobilization preceded site cleanup activities. The 184-B site cleanup activities were initiated January 26 and final grading of the site was completed March 1, 1988. The 184-D site cleanup mobilization was started February 16 and demolition of the structure began February 22, 1988. The 184-D final site grading and inspection of work area was completed March 29, 1988. The 1717-F site cleanup demolition started March 22, 1988 and final grading of the site was completed April 5, 1988. Decommissioning Engineering and Operations site walk down on April 6, 1988 officially verified completion of the project.

Table 1. 184-B and -D Powerhouses and 1717-F Maintenance Shop Final Site Cleanup Costs. ($ 000)

| | Total |
|---|---|
| Project Management | 17.6 |
| Project Support/Admin. | 5.5 |
| Engineering | 17.6 |
| Characterization | 0.2 |
| Demolition | 55.7 |
| Waste Disposal | 9.4 |
| G & A/CSP | 22.7 |
| Total | 128.7[a] |

[a]Project costs for September to complete the Facility Decommissioning Report (FDR) are estimated.

## 7.0 CONCLUSION AND LESSONS LEARNED

The decommissioning of the 184-B Powerhouse, 184-D Powerhouse, and the 1717-F Maintenance Shop are part of the long-range strategy for disposition of the Hanford Site shut down production reactor areas. Work was accomplished very efficiently and without any significant problems because of lessons learned on the other site cleanup projects. Several innovations were used during the final site cleanup efforts which increased the efficiency of these projects. The lessons learned are:

- The site liquid hazardous waste normally processed by pumping into 55 gal drum and solidified for offsite hazardous waste contractor disposal was reviewed for viable cost effective alternatives for disposal of the brine pit water with salt (NaCl) concentrations greater than one-tenth of the 10% limit. The alternative assessment resulted in using the offsite hazardous waste contractor's bulk tanker truck to directly load into from the brine pits. The direct bulk removal eliminated the drums, solidification, transportation to site hold-area, double handling, and reduced overall labor involvement that improved the disposal cost efficiency by a factor of approximately five.

- The brine pit salt cake was also loaded directly, without intermediate processing, into the contractor's dump truck which also resulted in an increase in efficiency by eliminating packaging and reducing labor handling cost. However, the truck demurrage charge for the loading effort made it comparable from a cost standpoint.

- The dozer and front-end loader operators kept the job on schedule by placing debris directly into the authorized demolition waste disposal site when conditions were advantageous. The proximity of some of the demolition site to the authorized disposal site allowed the debris to be moved directly by dozer and/or frontend-loader without use of dump trucks. Direct placement eliminated dump truck loading, hauling, dumping and return which is essentially dead time for operating heavy equipment working near the disposal sites. Also, the schedule was maintained by using the direct placement techniques when dump trucks were unavailable or out of service for repair during the site cleanup work.

- The backhoe hydraulic ram (breaker) proved to be an effective demolition tool when dealing with subsurface reinforced flat concrete structures. The use of the hydraulic hammer to demolish the three large stack foundations at the 184-D site proved to be very cost effective. Demolition of the stack foundations totaled 40 manhours.

There were no structural problems encountered during the demolition work that posed significant industrial hazards, and spraying the work area with water proved an excellent way to minimize dust. A very good safety record was established in performing this work; no lost-time injuries reported, no OSHA recordable injury, and no first aid injuries sustained.

All decommissioning activities were performed with the utmost regard to the personnel involved. Procedures, clothing, and equipment, including safety equipment, were provided. All workers wore appropriate radiation detecting dosimeters. The occupational radiation exposure to personnel during the final site cleanup efforts was essentially zero.

## 8.0 REFERENCES

The following documents are cited in this report.

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